

least some of the bonding lines are in angle of about  $70^{\circ}$ - $110^{\circ}$  to the lengthwise direction of  
at least some of the strips of the grid.

#### REMARKS

Claims 1-7 and 9-12 are pending herein. By this Amendment, claim 1 is amended to recite that the strips are bonded together with bonding points or bonding lines with at least some of the bonding lines being at an angle of about  $70^{\circ}$ - $110^{\circ}$  to the lengthwise direction of some of the strips. Support for this amendment may be found at least at, for example, page 3, lines 7-15 and Figure 1 of the present specification.

The attached Appendix includes a marked-up copy of the rewritten claim (37 C.F.R. §1.121(c)(1)(ii)).

Entry of this Amendment is proper under 37 CFR §1.116 since the amendments: (a) places the application in condition for allowance (for the reasons discussed herein) or places the application in better form for appeal, should an appeal be necessary. The Amendment does not present any additional claims without canceling a corresponding number of finally rejected claims, does not raise the issue of new matter, and does not raise any new issues requiring additional search and/or consideration since the Amendment is directed to subject matter previously considered during prosecution, namely in Applicants' March 20, 2001 Amendment. Furthermore, the amendments are necessary and were not earlier presented because they are in response to issues raised in the final rejection.

Applicants thank Examiner Kilkenny for the courtesies extended to Applicants' representative during the August 29, 2001 interview. Applicants' separate summary of the substance of the interview is contained herein.

#### I. Claim Rejections Under 35 U.S.C. §103(a)

Claims 1-7 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 5,458,711 (Yang) in view of U.S. Patent No. 4,483,438 (Kobiella) and

U.S. Patent No. 4,265,954 (Romanek). Claim 6 was rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Yang in view of Kobiella and Romanek and further in view of U.S. Patent No. 3,560,291 (Foglia). These rejections are respectfully traversed.

The Patent Office alleges that Yang teaches a grid of polymeric strips. The Patent Office alleges that Romanek and Kobiella teach pattern bonding or separated bonding. Applicants respectfully submit that Yang in view of either Romanek or Kobiella fails to teach or suggest the grid of the present invention comprising polymeric strips bonded with spatially separated bonding points or bonding lines wherein at least some of the bonding lines are in an angle of about 70°-110° to the lengthwise direction of some of the strips of the grid. Applicants further respectfully submit that the cited references fail to teach or suggest the unexpected results of the present invention, i.e., that the present invention provides a weld of superior strength in comparison to conventional welds.

The present inventors have learned that forces exerted in the longitudinal direction of a first strip in a grid of strips will automatically be transferred, via the bonding, to forces transverse to the longitudinal direction of a second strip. However, this transverse force is in the direction of low tensile strength of the second strip, and consequently, will cause the second strip to split.

The split in the second strip will initiate in turn, via the bonding, a crack in the first strip that runs in the perpendicular direction to the split second strip. Thus, a load in the longitudinal direction of one strip, although not exceeding its tensile strength, nevertheless will indirectly cause early breaking of that strip due to this force transfer mechanism. Separating the welds in the longitudinal direction of the loaded strip (as shown in Fig. 1) allows the transverse strip (second strip above) to split between the welds. Once split, the transverse strip is incapable of exerting any force on the loaded strip at the point of this split

due to the separation of the welds, and hence cannot cause early rupture of the loaded strip. See the paragraph bridging pages 2 and 3 of the specification for a further description.

Thus, spatially separated bonding lines that are about  $70^{\circ}$ - $110^{\circ}$  to the direction of the load are necessary to prevent early rupture of the loaded strip. As recited in claim 1, some of the spatially separated bonding lines are in angle of about  $70^{\circ}$ - $110^{\circ}$  to the lengthwise direction of at least some of the strips of the grid. Therefore, a split in the second strip will not cause early rupture of the weld since some of the spatially separated bonding lines are  $70^{\circ}$ - $110^{\circ}$  to the loaded strip. Bonding lines parallel to the loaded strip will not provide the same advantages since a split in the second strip will result in early rupture of the weld.

The spatially separated bonding points of the present invention also allow the transverse strip to split without cracking the weld between the transverse and longitudinal strips. The spatially separated bonding points clearly do not span the entire width of the weld in the longitudinal direction of the loaded strip. See page 3, lines 7-12 of the specification.

Kobiella, on the other hand, teaches that its fused portions are parallel to the direction of the strap. Thus, the bonding lines of Kobiella are never about  $70^{\circ}$ - $110^{\circ}$  to the direction of the strap or to the direction of the load, and therefore Kobiella fails to teach or suggest the present invention. Kobiella also only describes one strap, and Kobiella does not teach or suggest a grid comprising two or more strips.

Moreover, Kobiella is only concerned with maintaining the tensile strength in one direction of the strip. Thus, the combination of Kobiella and Yang fails to teach or suggest the present invention.

Romanek likewise fails to teach or suggest the necessity of spatially separated bonding lines that are about  $70^{\circ}$ - $110^{\circ}$  to the applied force. Romanek is directed to the bonding of non woven sheets or webs of fibers to another sheet of material by fusion. The sheets comprise relatively large areas, and bonding over the entire surface thus can lead to

stiff composites, which may make these composites unsuitable for some applications.

Romanek teaches to bond the sheets in certain areas to avoid stiffness. Romanek fails to teach or suggest anything regarding grids. Moreover, Romanek teaches nothing regarding the physics of bonding grids and the necessity of bonding points or bonding lines to the strength of the grid. Thus, Romanek fails to teach or suggest the present invention.

Finally, Yang in view of Kobiella and Romanek fail to teach or suggest the increase in weld strength as discussed on page 6, lines 22-27 of the present specification. Conventional welds as disclosed in Fig. 2 of the present specification and described in Yang suffered about a 15% decrease in strength retention of a longitudinal load bearing strip. In the same experiment, the weld according to the present invention in Fig. 1 suffered no such decrease in strength retention despite the occurrence of cracks in the transverse strip. Thus, the inventors have determined that a stronger weld may be made by using less weld area as the geometry of the weld plays an integral part of the determining weld strength.

For at least the foregoing reasons, Applicants respectfully submit that Yang, Kobiella and Romanek fail to teach or suggest the present invention. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Claim 6 was rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Yang in view of Kobiella and Romanek and further in view of Foglia. This rejection is respectfully traversed.

The Patent Office alleges that Foglia teaches the use of a laser to bond thermoplastic structures. Thus, Foglia fails to remedy any of the deficiencies of Yang, Kobiella and Romanek. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

II. Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully submit that claims 1-7 and 9-12 are in condition for allowance.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,



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Attachment:  
Appendix

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## APPENDIX

## Changes to Claims:

The following is a marked-up version of the amended claim:

1. (Amended) A grid comprising drawn polymeric strips in at least two different directions, wherein the strips have a higher tensile strength in a lengthwise direction of the strips compared to a tensile strength in a width direction of the strips, wherein ~~with~~ the strips ~~being~~ are bonded together in at least one zone of overlap, wherein said at least one zone of overlap comprises at least two spatially separated bonding points or bonding lines, and wherein at least some of the bonding lines are in angle of about 70°-110° to the lengthwise direction of at least some of the strips of the grid.